times to engineering journals and to the proceedings of technical societies, is possibly susceptible of some slight improvement in co-ordination, which will no doubt receive consideration in future editions, and so bring it up to the admirable standard of the subject-matter.

A chapter is devoted to a consideration of the action of sea-water on cement, in which the author details the results of certain experiments which he carried out. The conclusion which he arrives at in regard to the use of salt water for mixing is scarcely one which will be endorsed by all engineers who have had experience in maritime works. When concrete is deposited, as is often the case, beneath the surface of the sea, in a viscous condition, it is a matter of indifference whether it has been mixed with fresh water or with salt—the salinity of its environment is bound to permeate it before it has time to set. This consideration applies equally to mass work deposited at low water in tidal situations.

Brysson Cunningham.

## *SOME DEVELOPMENTS IN BRITISH INDUSTRY DURING THE WAR.*

IT is, of course, too soon to attempt to gauge the full effect of the great war upon the development of the world's industries, or to seek to determine how it will ultimately affect the relative position of the belligerent nations as trading communities or their respective influence upon international commerce. But there can scarcely be a doubt that with the defeat of the Central Powers, and the consequent upheaval in their social and political status, the centre of gravity, as it were, of the whole system of the world's trade has been profoundly, and, indeed, fundamentally, changed. During the last four or five decades Germany had achieved an astonishing expansion in industrial progress. In certain branches of manufacture, especially in those directly dependent upon the application of science, she was rapidly becoming supreme among the nations, and could, in many cases, impose her own terms upon those who desired to purchase her products.

The war has served to bring home to us, as nothing else could have done, the ramifications of the subtle and insidious conspiracy by which her Government and her leaders of finance, commerce, and industry sought to make that supremacy comprehensive and complete, assured and unassailable. As regards the technical applications of science, blinded by her unquestioned successes in assimilating and turning to practical account the discoveries of more creative nations, she had lulled herself into the belief that she had nothing to fear from any of her trade competitors, certainly not from this country, from whom she had appropriated and steadily exploited certain "key" industries. Furthermore, she had persistently, by methods fair and foul, sought through the course of years to obtain control of the principal sources of important raw materials, especially of such as are essential in modern warfare or necessary for the welfare of her people in such a war as she contemplated. She had studiously contrived also that this control should work to the disadvantage of this country in case we should be drawn into the struggle. This latter fact might be illustrated by a hundred examples culled practically from every oversea Dominion. It was only on the outbreak of war, and on our inevitable participation in it, that the meaning and true intention of this crafty and treacherous combination were fully realised.

When, therefore, we were driven to draw the sword in compliance with our treaty obligations, we were suddenly face to face with the peril in which we stood from a too trustful confidence in the integrity of a nation the highest ethical and political ideals of which are now seen to have been based upon the precepts and practices of a dynasty which, in raising it to power with a ruthless disregard of every moral consideration, at length overreached itself, and involved itself in ruin and its people in disaster. How we grappled with this peril and overcame it has been the wonder and admiration of the civilised world, and will ever remain one of the proudest episodes in our national history. Nothing in our existence more strikingly exemplifies the innate qualities and genius of our race. For years past it was the confident belief of the intellectuals of Germany that we were a decadent people, that we had lost our old-time virility and were enervated by wealth and material success. To those who only superficially knew us, and were, moreover, biassed by a predisposition to exalt themselves and to regard more the motes in other people's eyes than the beam in their own, there might appear some ground for this belief. We were too much concerned in minding our own business and in seeking to solve our own social problems to pay the heed that the sequel showed we ought to have done to the Machiavellism of our cunning and deceitful foe. But the shock of war brought a rude awakening, at first to us, and ultimately to our enemies. We, like them, have been tried as in a furnace, and we at least have come triumphantly through the ordeal, welded, strengthened, and ennobled, with purer ideals and a larger and richer conception of our place and destiny in the world. The beaten and disillusioned foe will, we may hope, be no less bettered by the fiery trial; bruised with adversity, her pride fallen with her fortune, and her "swashing and martial outside" a hateful memory, let us trust that she will throw down her false gods. In that case, what we learned to know and to respect in the Germany of old will not be wholly destroyed; we may hope it is too ingrained in the national character not to reassert itself, and that it will bring her once more within the comity of nations.

The true story of this most momentous episode will tax the insight and imagination of successive historians for centuries to come, for the world has never witnessed the like of it, and will, we trust, never see its repetition. Civilisation has at length risen, as never before, to the conception that such a method of settling national aspirations or international disputes is an affront to the common sense of humanity, and that it ought not to pass the wit of man to devise some more rational means of composing them. What the method is to be is the great problem, for a solution of which the whole world waits with anxious expectation.

In analysing the conditions and circumstances which have determined the issue of this great struggle the historian must necessarily have regard to the genius, mentality, and characteristic attributes of the contending nations, for, in the long run, they are the main factors which tell for success. In this age of printing and of meticulous care in the preservation of public documents he will not be gravelled for lack of matter. We have already almost countless memorials and *mémoires pour servir*. Among them we may cite a stimulating paper by Mr. F. G. Kellaway, M.P., on "Some Developments in Industry during the War," addressed to the Industrial and Reconstruction Council, and published in an abridged form in NATURE of January 30. Even on its own subjects it is by no means exhaustive. But *ex pede Herculem*. We may judge of the whole from the specimens. And Mr. Kellaway's specimens are admirably typical and illustrative of the point which we desire to enforce: that it was to the inborn qualities of our race, its courage and tenacity of purpose, its resourcefulness and power of initiation, its inventiveness, adaptability, and steady determination to "win through," in spite of every obstacle, setback, or difficulty, that brought us victory in the end and crushed the greatest crime against humanity the world has ever known.

The war, in the Prime Minister's phrase, quoted by Mr. Kellaway, has been as "a star-shell illuminating the dark places in our national life." It has "revealed with pitiless accuracy the defects in our industrial equipment." It is the purpose of the paper to show how, as the result of the war, many of these defects have been overcome, and that the United Kingdom, as a consequence, is now first in the world in almost every sphere of industrial effort. As we have already reproduced the main part of Mr. Kellaway's interesting paper, it is unnecessary to go into any great detail now concerning its contents. Its author shows how we have incidentally wrested from Germany her predominant position in electrical industry, and once more secured the control within our own Dominions of such vital materials as mica, tungsten, and chromium (for the manufacture of high-speed steel, armour-piercing shells, the wearing parts of aeroplane engines and gears in motor vehicles, stainless cutlery, and rustless steel). Tungsten and chromium were among the non-ferrous metals of which Germany had managed to capture the main sources of supply. We are told that before the war the British Empire produced 40 per cent. of the wolfram ore, but so successfully had Germany secured the trade that no British manufacturer had been able to establish the industry in this country. "At the outbreak of war one of the two firms endeavouring to manufacture in this country was only able to keep going with difficulty, and the other only succeeded in keeping its works going by entering into a contract to supply the whole of its output to Messrs. Krupp, of Essen." We have changed all that. British manufacturers are now in a position to deal with all the ore produced within the British Empire, and could, if necessary, convert the whole world's output into tungsten metal or ferro-tungsten. A similar result may—and, if we are wise, certainly will—follow in the case of zinc, which occupies the third place in importance among the non-ferrous metals, and of which Germany, owing largely to the control she had secured over the Australian concentrates, was the largest European producer, 77 per cent. of that which we needed being imported by us from her. Australia will no longer supply Germany with her zinc ore, and the British Empire bids fair to share with America the bulk of the zinc production of the world.

Even if space had permitted, it is unnecessary, for the reason already given, to dwell in any detail upon the other instances which Mr. Kellaway adduces of England's "wakening up" and of the rousing of her energies as the consequence of the call to arms. Official control, co-operation, and combination of effort unquestionably accelerated and facilitated the introduction of improvements in organisation, management, and practice, and have exerted a permanent influence upon industries which have been pressed into the service of war. It is seen in its effect upon the manufacture of machine-tools; in a vast improvement in machinery; in increased accuracy of work as a result of the necessity for organising the production of interchangeable repetition work; in improved methods of shop transport; and in a wider appreciation of the value of scientific knowledge in machine construction.

In no department is this more marked than in aircraft work. The experience of the war has effected nothing less than a revolution in this industry. A single instance must suffice. As Mr. Kellaway states, modern warfare, no less than much of modern transport, and, indeed, of modern industry in general, is dependent upon the magneto. "In the air it is an essential source of power and movement." Our position in 1914 with regard to the production of magnetos was exceedingly grave. Practically everything needed to make them in sufficient quantity was not procurable in the British Isles, and it required months—nay, years—of effort to surmount our difficulties. But they have been surmounted. "Instead of one firm producing only 1140 magnetos in a year, as was the case in 1914, we now have some fourteen firms producing 128,637 magnetos in a year. . . . It is not only that we are producing in quantity which makes us independent of outside sources; the quality of the British magneto is the highest in the world. It is lighter in weight and more reliable in service than the Bosch magnetos manufactured before the war, or than the latest examples found in captured German aeroplanes."

"It is thus not only on the field," adds Mr. Kellaway, "that we have beaten the Bosch." What is true of the magneto is equally true of the ignition-plug. In 1914 three firms were producing a yearly output of not more than 5000 plugs. By October 31, 1918, the yearly output of five firms had risen to 2,148,725, and they were being supplied, not only to our own Services, but also to our French, Italian, and American Allies.

The story of the influence of the war upon our glass industry, and especially upon the manufacture of scientific and optical glassware, is no less inspiriting. Germany has once more been beaten at Jena. But it will scarcely be credited that at the outbreak of war a considerable part of our artillery was equipped with gun-sights exclusively "made in Germany"—the dial sight No. 7 of Goerz. There is much that needs clearing up concerning the pre-war methods of the War Office, and surely this is a case in point. That we should have become dependent upon a potential enemy for so essential a piece of mechanism as a gun-sight is surely one of the most astonishing instances of departmental ineptitude that could be conceived. But it is reassuring to be told that the resourcefulness of our opticians has been equal to the nation's emergency. The British sight is described as "a beautiful and delicate piece of work, and its production in such numbers, and in a perfection which Germany never exceeded, is a triumph for British skill."

## NOTES.

THE achievement in wireless telephony recorded in the daily Press during the past few days is by no means unique. It is reported that Mr. Daniels, Secretary of the U.S. Navy, successfully telephoned a wireless greeting to President Wilson on board the *George Washington* when the vessel was more than eight hundred miles out at sea. According to a paper presented before the American Institute of Electrical Engineers, wireless and wire telephone systems can be linked so that the human voice will perform one lap of its journey over wire and the next lap through the ether to its final destination, while the replying waves will travel the air waves first and then proceed on wire. The operation of transferring sound from wire to air can be accomplished by a device similar to the repeater now used in long-distance telephony. Latest developments in connection with the wireless telephone would suggest the latter as an excellent supplement of wire systems. As a rival, however, it has not yet reached the stage when its claims can be considered seriously, partly because of the lack of secrecy involved in its use.

PROCLAMATION is made that the unlicensed importation into the United Kingdom is prohibited of the following articles:—All derivatives of coal-tar generally known as intermediate products capable of being used or adapted for use as dyestuffs, or of being modified or further manufactured into dyestuffs. All direct cotton colours, all union colours, all acid wool colours, all chrome and mordant colours, all alizarine colours, all basic colours, all sulphide colours, all vat colours (including synthetic indigo), all oil, spirit, and wax colours, all lake colours, and any other synthetic colours, dyes, stains, colour acids, colour bases, colour lakes, leuco-acids, leuco-bases, whether in paste, powder, solution, or any other form.

THE municipality of Le Havre, by a resolution of September 11, 1918, established the Institut Océanographique du Havre and appropriated funds for its maintenance. This places on a secure and public foundation the institute and laboratory of the University of Caen at Le Havre, and it will be conducted by the same staff, to the efforts of which during the past few years this last success is due, namely, the director, Dr. A. Loir, medical officer of health; the head of the laboratory, Mr. H. Legangneux; and the superintendent of biological research, Mr. E. Peau. Daily observations on the temperature and condition of the water, and on its bacterial, planktonic, and general biotic content, will be recorded at three fixed points, with the co-operation of naval officers. Other observations will continually be made at the French and British naval stations in the port, by permission of the respective commanding officers. Results of scientific and practical importance have already been obtained, and will now increase in number and extent.

MR. R. C. J. SWINHOE, of Mandalay, has presented to the Geological Department of the British Museum a collection of red amber from Burma, sometimes known as burmite, which contains the remains of a remarkably interesting insect fauna. The material has been examined by Prof. T. D. A. Cockerell, who has published in *Psyche* and in the Annals of the Entomological Society of America the descriptions of thirty-one new species, five of which are types of new genera. Most of these were contained in a block of amber rather larger than a man's fist; this has been cut into slices about half an inch thick, and every one of them is crowded with insect remains. There are representatives of Hymenoptera, Hemiptera, Homoptera, Diptera, Trichoptera, Coleoptera, Termites, Acarina, and Diplopoda—in fact, ants are about the only kind of insect the absence of which is conspicuous. The amber occurs in clay beds of Miocene age, but it was washed into them from higher levels, and may be much older. This is certainly the most important addition made of recent years to the very large collection of insects in amber already preserved in the department. It is unfortunate that the deep colour of the amber renders it very difficult to exhibit the specimens so that their contents can be seen by the public.

IN many cities of the United States there are historical societies which have organised museums illustrating the history of the State or locality, but there is no central museum of national history. So, too, there are many museums of art, well known for their treasures and their enterprise, but such collections as pertain to the National Gallery of Art are provisionally housed in one of the halls of the Natural History Museum. It is, therefore, good news that on January 29 a Bill was introduced by Congressman Hicks in the House of Representatives to provide for a national museum of history and the arts, and it was a happy thought of his to propose such an institution as a memorial to Theodore Roosevelt. The idea is one that would have commended itself to that wide-reaching, enthusiastic, and patriotic spirit, for it is intended to assemble and display, not merely relics illustrating the personal and political history of the United States, but also such objects as